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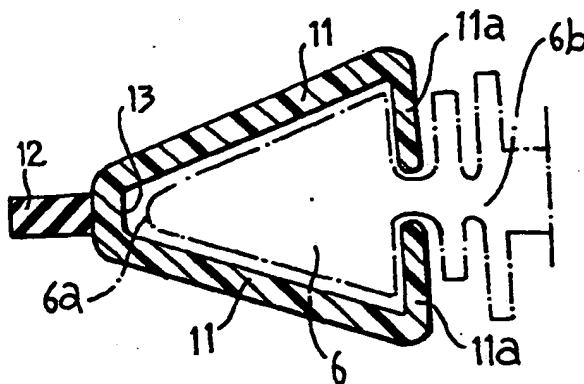


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(21) International Application Number: PCT/EP94/00735 (22) International Filing Date: 9 March 1994 (09.03.94) (30) Priority Data: TO93A000164 10 March 1993 (10.03.93) IT (71) Applicant (for all designated States except US): COOPER INDUSTRIES, INC. [US/US]; 1001 Fannin, Suite 4000, Houston, TX 77002 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): GILLI, Marco [IT/IT]; Corso Torino, 30, I-10023 Chieri (IT). MACHETTA, Domenico [IT/IT]; Via Sansovino, 131, I-10151 Torino (IT). (74) Agents: MARCHITELLI, Mauro et al.; Jacobacci-Casetta & Perani S.p.A., Via Alfieri, 17, I-10121 Torino (IT).		(81) Designated States: CA, JP, PL, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>

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(54) Title: **PROFILED PROTECTIVE ELEMENT FOR WINDSHIELD WIPER BLADES**



(57) Abstract

The element (10) presents a λ or Y configuration with two lateral branches (11) designed to embrace as a sort of firm coupler the wiper element (6) of the windshield wiper blade (4) and an appended part (12) designed, in this use, to extend toward the pane as a wiper element. Preferentially, the element is obtained by coextrusion of a plastic material designed to constitute the lateral branches (11) for coupling to the blade (5) and a rubber-like material, typically a thermoplastic rubber, designed to constitute the aforementioned appended part (12).

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Profiled protective element for windshield wiper blades

The present invention refers to the profiled protective elements for windshield wiper blades.

It is generally known in the automobile industry, that provision is made for the use of profiled protective elements designed to be fitted over windshield wiper blades during the preparation of a vehicle. This is especially true for the purpose of protecting the blades during the performance of treatments, such as the application of layers of wax, etc., designed to preserve the vehicle and in particular its body in the final phases of preparation during storage and shipping, especially under conditions of prolonged exposure to the elements. The same protective elements prove themselves to be useful when, before delivery to the final purchase, the vehicle is subjected to treatments (washing, etc.) to remove the protective layers previously applied to the vehicle itself.

A first solution known in the technology provides for making the protective elements in the form of profiled canal elements, generally c-shaped, designed to be fitted to the wiping lip of the windshield wiper blade making an entirely loose combination with regard to the lip itself. These profiled elements are made of materials such as, for example, polyethylene and are primarily designed to provide a sort of static protection in the sense that any activation of the windshield wipers (controlled for example to verify the operation of the driving motor) produces an almost immediate detachment of the protective elements because of the effect of the movement of the blade or blades with regard to the underlying glass (pane).

Furthermore, there are known in the technology solutions in which the profiled element is capable of being combined with the respective blade of the windshield wiper

by making a sort of combination in order to prevent any activating of the windshield wiper from causing the immediate detachment of the protective elements. In addition, in these previously known solutions, it is also provided that the protective elements present an appended part forming a lip designed, in this case, to extend toward the pane. In this way, if the windshield wiper is activated, the appended part is capable of exerting a sort of wiping action on the surface of the pane, meanwhile preventing the pane itself from being scored.

In current practice, however, it is observed that the requirement of accomplishing a firm effect of retention of the protective element on the windshield wiper blade contrasts with the requirement of having the appended part capable of performing an effective wiping action.

Therefore, there persists the requirement of providing a profiled protective element designed to be fitted temporarily to the blades for windshield wipers which, on the one hand, are able to remain combined with the blade during the activation of the windshield wiper for a sufficiently long time (for example to verify the functionality of the windshield wiper driving motor) and, on the other hand, capable of performing a good wiping action on the glass, so as to be able to carry out, as it were, the service blade function capable of being used in all phases preceding the delivery of the vehicle to the final purchaser (for example when the vehicle is placed in parking lots under rain).

The purpose of the present invention is to provide a profiled protective element for windshield wiper blades with the characteristics referred to in the preamble of Claim 1 to satisfy the above-mentioned demand.

According to the present invention, this purpose is obtained thanks to an element

having the characteristics claimed in Claim 1.

The invention will now be described, purely by way of a non-limiting example, with reference to the attached drawings, in which:

- figure 1 is a general perspective view of the arm of a windshield wiper, with the related blade attached, which illustrates the criteria for fitting a profiled protective element according to the invention,
- figure 2 is an enlarged and partial perspective view of a protective element trunk according to the invention, and
- figure 3 is an enlarged cross section view, according to the line III-III of figure 1, of the profiled protective element according to the invention.

[Only figure 3 included in original document].

In figure 1 one windshield wiper for automotive vehicles, typically for automobiles, is indicated in its entirety by 1.

According to well-known criteria, the windshield wiper in question is basically composed of an arm 2 designed to be fitted, a shaped block 3 defining the proximal end of the arm-2, on the motorized shaft of the windshield wiper (not visible in the drawing). The distal end of the arm 2, on the other hand, has a blade 4 fitted to it which is designed to perform the wiping action on the glass (pane) to which the windshield wiper 1 is associated.

In particular, the connection of arm 1 to the block 3 is done by means of a general hinge configuration with the insertion of a spring (not visible in the design) design, in this utilization, to pull back the arm 2 as well as the blade 4 borne by it as a movement with a controlled load on the surface of the glass (not shown).

The blade 4 usually consists of one or more bows 5 hinged to the arm 2, which

sustain a profiled rubber element 6, usually stiffened and equipped with metal elements, constituting the wiper element as such, provided with a front lip from the generally triangular or blade profile (in practice "like a pine tree").

All of this is according to principles well-known in the technology; in this regard it is recalled that in the technology windshield wiper structures other than the one described are known and used, for example, solutions in which the wiper element 6 is supported, at least in part, directly by the arm 2. In each case, the solution according to the invention is also applied to windshield wipers with a structure different from that described herein, regardless of the approach adopted for fastening the blade and/or the wiper element to the arm 2.

With 10, a profile protective element is described in the whole design to be applied to the blade 4 at the time of preparing the vehicle (for example an automobile) on which the windshield wiper 1 is fitted.

As has already been indicated in the introductory part of the description, the function of the profiled element 10 is, in general, that of protecting the blade 4, in particular the wiper element 6 thereof, against the action of external agents such as protective waxes sprayed on the vehicle, washing agents designed to remove these protective waxes, etc.

The element 10 consists of a profiled element, preferably one of plastic material, having a general grooved configuration which enables it to be fitted on the blade 4, and in particular, on the wiper element 6, usually making it run longitudinally with regard to the wiper element 6 itself.

Thus, as is better visible in the cross section of figure 3, the wiper element 6 (the profile of which is reproduced in dashed lines) shows a triangular section (in practice,

"like a pine tree") with two lateral faces converging toward each other toward a terminal face 6a, designed to accomplish the wiping action of the glass as such. At the opposite end, the wiper element 6 shows a stem part 6b acting as a connecting part to the other parts of the blade 4.

The protective element 10 shows a general λ or Y profile with two side branches 11 designed, in the fitting arrangement of the element 6 on the blade 4, to extend along lateral faces of the wiper element 6. For this purpose, the lateral branches 11 of the element 10 show apex parts 11a turned toward each other and designed to embrace, by wrapping around it, the part of the wiper element 6 between the lower end of the lateral faces thereof and the stem part 6b. The side branches 11 of the element 10 are connected together in correspondence with a root part which, in the utilization, constitutes an appendix 12 designed to protrude toward the pane, as a support thereon.

Preferentially, the protective element 10 consists of a shaped body obtained by extrusion (coextrusion) of plastic material with the utilization of plastic materials having differentiated characteristics as far as the lateral branches 11 and the appendix 12 are concerned.

The use of differentiated materials is designed to confer mechanical characteristics and, in general, differentiated physical characteristics to the lateral branches 11 and to the appended part 12.

For the lateral branches 11, a generally rigid plastic material is used, such as, for example, polyethylene. The lateral branches 12 must, in fact, exert the necessary retaining action by holding to their inside in a sufficiently firm manner the wiper element 6 so as to secure the protective element 10 on the blade 4. All of this is to prevent the

protective element 10 from becoming accidentally removed from the blade 4 when it is moved by the effect of the action of the windshield wiper.

According to an important characteristic of the solution according to the invention, the material constituting the appendix 12 is chosen so that the appendix 12 itself can constitute a wiper element as such, as far as the characteristics and the operational approach are concerned, basically similar to the wiper element 6.

For this reason, in a preferred manner of action of the invention, for the realization of the appendix 12, a material substantially similar to rubber is used, for example a thermoplastic rubber.

In particular, having a thermoplastic matrix (for example, polyolefinic) substantially identical or similar to the thermoplastic material constituting the lateral branches 12 is preferred. In this regard, the use of the materials sold by the Monsanto Company (USA) under the commercial name of "Santoprene" has proven to be advantageous.

The element 10 can therefore be easily made (according to well known criteria) in the form of a single extruded profiled element (more correctly, coextruded) with branches 11 of a sufficiently consistent plastic material (for example, polypropylene or polyethylene) in the central appendix 12 of a thermoplastic rubber (for example, made up of material known as "Santoprene").

This result can be obtained generally thanks to the fact that the appended part consists of a material that, on the one hand, presents characteristics similar to the characteristics of rubber (which makes it possible to obtain the characteristics of a wiper element) and, on the other hand, is similar (especially with regard to the composition of the thermoplastic matrix) to the material constituting the remaining parts (branches 11) of element 10.

The experiments performed by the applicant have shown that the dimensions of the appended part 12, and in particular the height/width ratio thereof, defined in a coordinated fashion with the hardness characteristics of the material constituting the appendix 12 itself, have a certain importance in obtaining an entirely satisfactory solution from the functional viewpoint.

In a specific way, the experiments performed by the applicant have shown as preferential the choice of a thermoplastic rubber having a hardness of around 60 Shore A and a height/width ratio running between 1.5 and 2.5. Naturally, the height dimension is understood as that defined in the direction of greatest extension of the appendix 12, thus in a direction substantially perpendicular to the surface of the glass during arrangement of use of the protective element 10.

The above-mentioned values are related to a pressure load of the blade 4 toward the underlying glass included in the range of 800 grams to 1 kilogram, approximately normal usage values in the automobile industry. Naturally, in the presence of lower load values (respectively, higher) it is possible to resort to plastic generally softer and more yielding materials (respectively, more rigid and stiffer) and/or to greater height/width ratios (respectively, lower) with regard to those described above for making the appendix 12.

Still, the experiments performed by the applicant have shown as preferential the choice of avoiding an overly tight combination between the element 10 and the wiper element 6. This is valid in particular for the end face 6a: in the section of figure 3, in fact, it can be observed how the combination between the protective element 10 and the wiper element 6 proves to be generally loose, with a certain space (indicated with 13) left between the face 6a and the region of the element 10 in which the lateral

branches 11 are connected to each other and to the appendix 12.

Naturally, with the principle of the invention remaining firm, the details of embodiment and the approaches may be broadly varied with regard to what is described and illustrated, without for this reason leaving the scope of the present invention.

CLAIMS

1. A profiled protective element (10) for windshield wiper blades, with the element capable of being combined (12) with a respective windshield wiper blade (4) and being provided with an appended part (12) designed, in use, to extend toward the glass, characterized by the facts that:

- the aforesaid profiled element presents parts (11) for combining with the blade (4) which create, with regard to the blade (4), a coupling combination that prevents the detachment of the profiled element (10) from the blade (4) itself and,
- the aforesaid appended part (12) has characteristics of a wiper element.

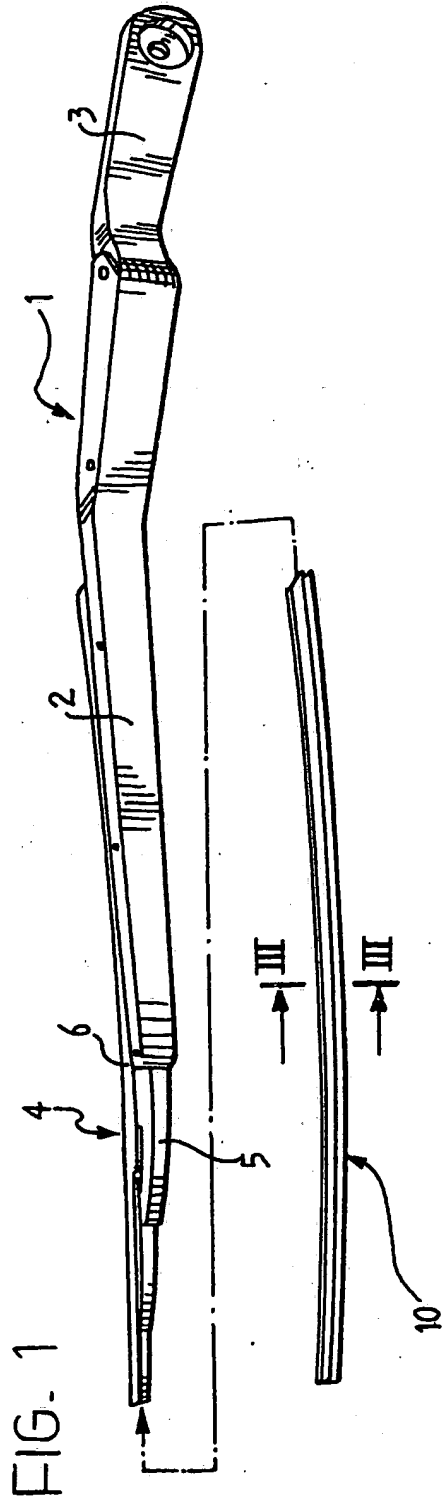
2. A profiled element according to Claim 1, characterized by the fact that it presents a general λ or Y configuration with two lateral branches (11) capable of realizing a sort of combination with the blade (4) and a root part constituting the aforesaid appended part (12).

3. A profiled element according to Claim 2, characterized by the fact that the aforesaid lateral branches (11) present apex parts (11a) converging toward each other so as to combine as a sort of at least partial wrapping with the wiper element (6) of the said blade (4).

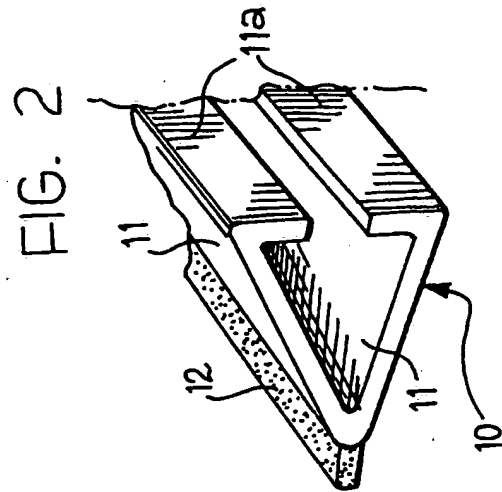
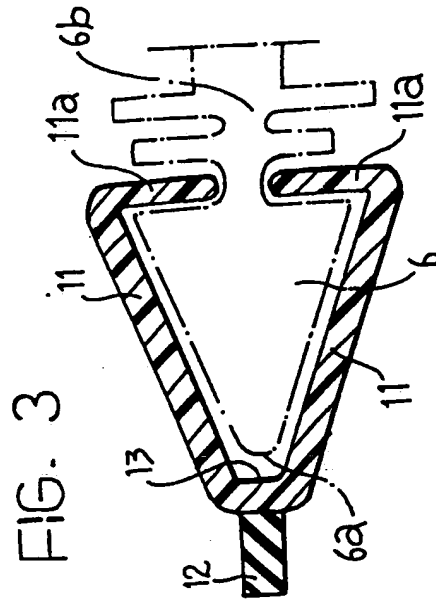
4. A profiled element according to any of the preceding claims, characterized by the fact that it is made of a plastic material substantially more rigid than the material constituting the aforesaid appended part (12) in the part (11) designed to be combined with the windshield wiper blade (4).

5. A profiled element according to any of the preceding claims, characterized by the fact that it is configured (13) so as to not interfere substantially with the active edge (6a) of the wiper element (6) of the aforesaid blade (5).

6. A profiled element according to any of the preceding claims, characterized by the fact that the aforesaid appended part (12) is made of a material with characteristics similar to the characteristics of rubber.
7. A profiled element according to Claim 6, characterized by the fact that the aforesaid appended part (12) is made of a thermoplastic rubber.
8. A profiled element according to Claim 6 or 7, characterized by the fact that the aforesaid appended part (12) is embodied with a material having a thermoplastic matrix.
9. An element according to Claim 8, characterized by the fact that the aforesaid matrix is a polyolefinic matrix.
10. A profiled element according to Claim 1 or 6, characterized by the fact that the aforesaid appended part (12) consists of a material essentially similar to the material constituting the remaining parts (11) of the profiled element itself.
11. A profiled element according to Claim 7, characterized by the fact that the matrix of the thermoplastic rubber substantially consists of polyethylene.
12. A profiled element according to any of the preceding claims, characterized by the fact that it consists of a single piece of an extruded plastic material.
13. A profiled protective element for windshield wiper blades, substantially as described and illustrated and for the specified purposes.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 94/00735

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 B60S1/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 B60S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB,A,2 069 326 (ROBERT BOSCH) 26 August 1981	1-6,10,12
Y	see abstract; claims 1-6,12; figure 1 see page 1, line 4 - line 35 see page 1, line 47 - line 87 see page 1, line 123 - page 2, line 12	7-9,11
Y	PATENT ABSTRACTS OF JAPAN vol. 7, no. 271 (M-260) 3 December 1983 & JP,A,58 149 843 (MITSUBISHI JIDOSHA) 6 September 1983	7-9
A	see abstract	6
Y	PATENT ABSTRACTS OF JAPAN vol. 6, no. 93 (M-133) 29 May 1982 & JP,A,57 030 646 (TOYODA GOSEI) 18 February 1982	7,8,11
A	see abstract	6

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

24 May 1994

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INTERNATIONAL SEARCH REPORT

International application No.
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US,A,3 545 028 (POLAND) 8 December 1970 see the whole document ---	1-3,6 4
A	DE,A,36 37 106 (AUDI AG) 19 May 1988 see abstract; claims 1,2,13,14; figures 1-6 see column 2, line 38 - column 3, line 37 see column 4, line 41 - line 55 see column 5, line 19 - line 64 see column 6, line 30 - line 45 -----	1,4-6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/EP 94/00735

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US-A-3545028	08-12-70	NONE	
DE-A-3637106	19-05-88	NONE	